

WHAT IS CLAIMED IS:

- 1 1. A method for infiltrating an organic material into spaces in one or more nanostructures,
2 comprising:
3 disposing the organic material proximate the nanostructures; and
4 exposing the organic material to a solvent vapor.
- 1 2. The method of claim 1 wherein disposing the organic material proximate the
2 nanostructures includes disposing a layer of a polymer process solution on a
3 nanostructured template.
- 1 3. The method of claim 2 wherein the nanostructured template has spaces between about 5
2 nm and about 1000 nm wide.
- 1 4. The method of claim 2 wherein the spaces in the nanostructured template include tubes
2 between about 1 nm and about 1000 nm in diameter with a tube density between about
3 10^{12} tubes/m² and about 10^{16} tubes/m².
- 1 5. The method of claim 1, wherein the nanostructures include one or more nanopores,
2 cavities, or interstitial spaces between pores, tubes or rods.
- 1 6. The method of claim 5 wherein disposing the organic material proximate the
2 nanostructures includes mixing the nanotubes into a polymer process solution.
- 1 7. The method of claim 1 wherein the organic material is a small molecule.
- 1 8. The method of claim 1 wherein the organic material is a pigment, dye or fullerene.
- 1 9. The method of claim 1 wherein the organic material is a polymer.
- 1 10. The method of claim 9 wherein the polymer includes one or more polymers selected from
2 the group of poly(phenylene) and derivatives thereof, poly(phenylene vinylene) and
3 derivatives thereof (e.g., poly(2-methoxy-5-(2-ethyl-hexyloxy)-1,4-phenylene vinylene
4 (MEH-PPV), poly(para-phenylene vinylene), (PPV)), PPV copolymers, poly(thiophene)
5 and derivatives thereof (e.g., poly(3-octylthiophene-2,5,-diyl), regioregular, poly(3-
6 octylthiophene-2,5,-diyl), regiorandom, poly(3-hexylthiophene) (P3HT), poly(3-
7 hexylthiophene-2,5,-diyl), regioregular, poly(3-hexylthiophene-2,5,-diyl), regiorandom),
8 MDMO, poly(thienylenevinylene) and derivatives thereof, and poly(isothianaphthene)

9 and derivatives thereof, tetra-hydro-thiophene precursors and derivatives thereof, poly-
10 phenylene-vinylene and derivatives organometallic polymers, polymers containing
11 perylene units, poly(squaraines) and their derivatives, discotic liquid crystals
12 polyfluorenes, polyfluorene copolymers, polyfluorene-based copolymers and blends, e.g.
13 co-polymerized and/or blended with materials such as charge transporting (e.g. tri-
14 phenyl-amines and derivatives) and/or light-absorbing compounds (e.g. fused thiophene
15 rings and derivatives, generally hetero-atom ring compounds with or without
16 substituents), and/or fullerenes, dyes or pigments.

1 11. The method of claim 10 wherein solvent vapor includes chloroform is selected from the
2 group of acetone, chloroform, benzene, cyclohexane, dichloromethane, ethanol, diethyl
3 ether, ethyl acetate, hexane, methanol, toluene, xylene, mixtures of two or more of these,
4 and derivatives of one or more of these.

1 12. A method for making an optoelectronic device, comprising:
2 providing a nanostructured template having spaces between one or more nanostructures;
3 infiltrating an organic material into the spaces by disposing the organic material
4 proximate the nanostructures and exposing the organic material to a solvent vapor; and
5 placing the nanostructured template and or organic material in electrical contact with an
6 electrode.

1 13. The method of claim 12 wherein disposing the organic material proximate the
2 nanostructures includes disposing a layer of an organic process solution on a
3 nanostructured template.

1 14. The method of claim 12 wherein the spaces in the nanostructured template include tubes
2 between about 1 nm and about 1000 nm in diameter with a tube density between about
3 10^{12} tubes/m² and about 10^{16} tubes/m².

1 15. The method of claim 12 wherein the organic material includes small molecules.

1 16. The method of claim 15 wherein the small molecules include pentacene or pentacene
2 precursors.

1 17. The method of claim 12 wherein the organic material is a pigment, dye or fullerene.

1 18. The method of claim 12 wherein the organic material is a polymer.

- 1 19. The method of claim 18 wherein the polymer includes one or more polymers selected
2 from the group of poly(phenylene) and derivatives thereof, poly(phenylene vinylene) and
3 derivatives thereof (e.g., poly(2-methoxy-5-(2-ethyl-hexyloxy)-1,4-phenylene vinylene
4 (MEH-PPV), poly(para-phenylene vinylene), (PPV)), PPV copolymers, poly(thiophene)
5 and derivatives thereof (e.g., poly(3-octylthiophene-2,5,-diyl), regioregular, poly(3-
6 octylthiophene-2,5,-diyl), regiorandom, poly (3-hexylthiophene) (P3HT), poly(3-
7 hexylthiophene-2,5-diyl), regioregular, poly(3-hexylthiophene-2,5-diyl), regiorandom),
8 MDMO, poly(thienylenevinylene) and derivatives thereof, and poly(isothianaphthene)
9 and derivatives thereof, tetra-hydro-thiophene precursors and derivatives thereof, poly-
10 phenylene-vinylene and derivatives organometallic polymers, polymers containing
11 perylene units, poly(squaraines) and their derivatives, discotic liquid crystals
12 polyfluorenes, polyfluorene copolymers, polyfluorene-based copolymers and blends, e.g.
13 co-polymerized and/or blended with materials such as charge transporting (e.g. tri-
14 phenyl-amines and derivatives) and/or light-absorbing compounds (e.g. fused thiophene
15 rings and derivatives, generally hetero-atom ring compounds with or without substituents)
16 , and/or fullerenes, dyes or pigments.
- 1 20. The method of claim 12 wherein solvent vapor is selected from the group of acetone,
2 chloroform, benzene, cyclohexane, dichloromethane, ethanol, diethyl ether, ethyl acetate,
3 hexane, methanol, toluene, xylene, mixtures of two or more of these, and derivatives of
4 one or more of these.